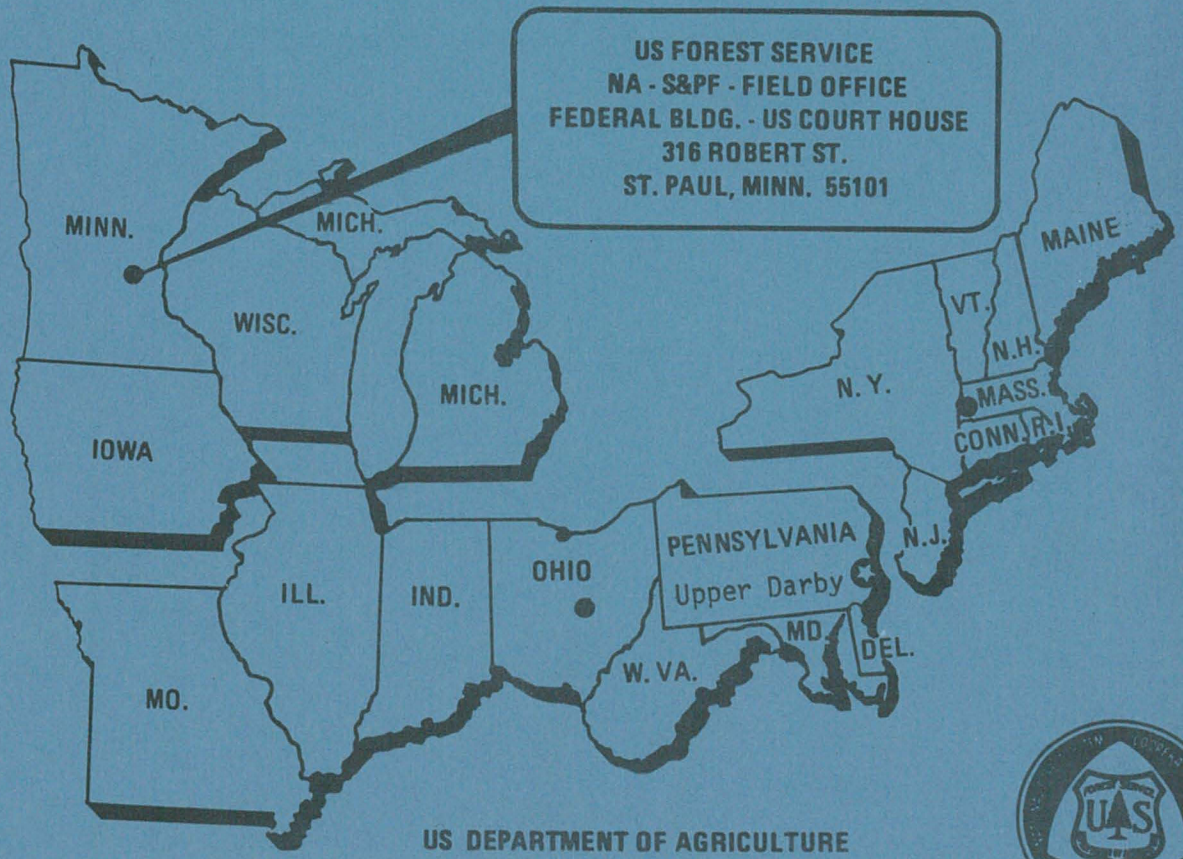
DIVISION OF FOREST PEST CONTROL

Northeastern Area State & Private Forestry

Rept. No. S-70-1 June, 1970 5230

EVALUATION OF SCLERODERRIS CANKER ON NATIONAL FOREST LAND IN THE LAKE STATES 1969 INTERIM REPORT

James T. O'Brien



US DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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ABSTRACT

Since 1966, plots established in 31 red pine plantations have been examined annually to evaluate damage caused by Scleroderris lagerbergii Gremmen. The 1969 examination revealed a 7% increase in trees infected, bringing the total infected up to 24%. The increase in infection is the largest in a single year since the study began. Tree mortality did not increase appreciably over that of the previous year.

INTRODUCTION

In 1966, plots were established to evaluate the spread of and damage caused by the pathogenic fungus Scleroderris lagerbergii Gremmen within infected red pine plantations in the Lake States. The study plots are in 31 plantations located on the Nicolet and Chequamegon National Forests in Wisconsin and on the Ottawa and Hiawatha National Forests in Upper Michigan.

This is the third interim report covering the annual examinations of the plots. It compares the initial (1966), 1967, 1968, and 1969 results.

OBJECTIVES

The objectives of the evaluation are: (1) to determine the annual rate of spread of S. lagerbergii within the infected red pine plantations on the four forests (2) to determine the annual rate of mortality caused by this pathogen within the infected plantations, and (3) to correlate the rates of disease spread and red pine mortality with host age.

METHODS

The methods of plantation selection and examination were described fully in the 1967 report[1/] and are only briefly reviewed here. Plantations from which selections were made included only those found infected in a 1965 survey. These were divided into two age groups--7-10 years old and 4-6 years old. Two to five plantations in each age group were selected per Forest. Approximate locations of the plantations selected are shown on the map (Fig. I).

Five square, 1/20th acre permanent plots were established in each plantation, except for three plantations on the Ottawa National Forest. In these, only four plots per

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1/ O'Brien, J. T. Evaluation of Scleroderris Canker on National Land in the Lake States - Plot Establishment and Progress Report - 1967 (Available from the St. Paul Field Office).

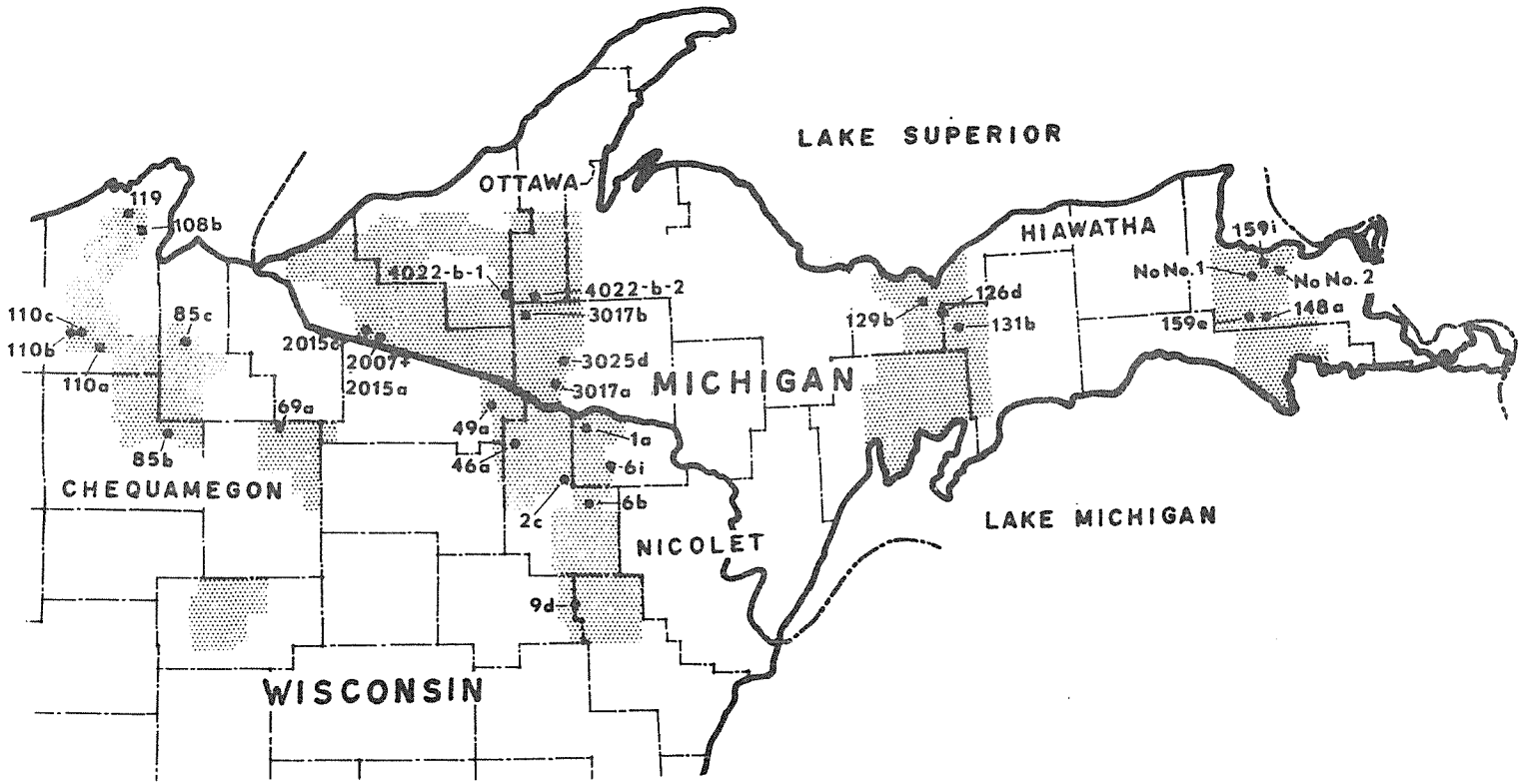

FIGURE I. APPROXIMATE LOCATIONS OF PLANTATIONS WITH SCLERODERRIS CANKER SPREAD PLOTS.

plantation were established. Each tree on each plot was examined annually and classified as to condition and to disease symptom expression.

RESULTS AND DISCUSSION

The results of the initial (1966), 1967, 1968, and 1969 examinations of the spread plots are summarized in Tables 1 and 2. Information by Forest is presented in Tables 3 to 6. The following terminology is used in the tables:

1. "Age group" indicates plantation age group in 1966. Plantations in the 7-10 year age group were planted between spring 1957 and fall 1959. Those in the 4-6 year age group were planted between spring 1960 and fall 1962.

2. All percent calculations are based on the number of trees found on the plots at the time of establishment (1966).

3. An "infected" tree is defined as a damaged tree having the characteristic yellow-green discoloration of the wood inside bark in the damaged portion. Cankered or damaged trees without the discoloration were not considered infected.

4. "Trees dead" indicates the percent of tree mortality due to all causes. The portion of these dead trees infected and presumably killed by S. lagerbergii is shown in Table 2.

In 1968-69 there was an increase in disease spread larger than in either 1966-67 or 1967-68 (Table 1). In the 7-10 year age group the percentage of trees infected rose 10% - from 25% to 35%. In the 4-6 year age group the increase

TABLE 1. Infection and Tree Mortality on Scleroderris Canker Study Plots, 1966-1969

Plantation Age Group	Trees Present in 1966	Percent of Trees Infected				Percent of Trees Dead			
		1966	1967	1968	1969	1966	1967	1968	1969
7-10	3345	16	23	25	35	8	10	10	11
4-6	4716	8	10	11	15	11	16	17	18
Total	8061	12	15	17	24	10	14	14	15

was 4% - from 11% to 15%. The percent of infection in the younger age group in 1969 was approximately equal to that in the older in 1966. Overall, infection has doubled since 1966 - from 12% to 24%.

There was little change in the rate of tree mortality in 1969 - about 1% in both groups. The proportion of dead trees apparently killed by Scleroderris canker is increasing as the stands grow older (Table 2).

Table 2. Proportion of tree mortality presumed caused by S. lagerbergii

Age Group	Proportion of Dead Trees Infected (Discolored)				
	1966	1967	1968	1969	Cumulative (All Years)
7-10	.63	.57	.67	.94	.64
4-6	.43	.39	.58	.72	.45
Average	.50	.44	.59	.81	.51

DISCUSSION

Scleroderris infection has reached high proportions in some plantations and is oflittle significance in others. In plantation 108b on the Chequamegon National Forest (Table 3) at least 85% of the trees are infected, while plantation 9d on the Nicolet National Forest (Table 4) is virtually free of the disease. Generally the more northerly plantations have the most infection. Of the plantations sampled on the Nicolet National Forest a high percentage of infection exists in only one (49a). In comparison, the data for most plantations on the Hiawatha National Forest (Table 6) portend serious losses. An average of 34% of the trees are infected, and infection has exceeded 70% in two plantations. Moreover, of the 44 trees that died on the Hiawatha plots in 1969, 42 were infected.

Overall the effect of a large increase in infection in terms of tree mortality is not fully known. Spread in 1966-67 was fairly high in the 7-10 year age group (about 7%) but a corresponding loss of trees is not yet apparent. Hopefully, after the 1970 (concluding) examination, sufficient data will be available to allow reasonably accurate prediction of the fate of an infected tree. It may be that where the infection rate is extremely high even relatively older, resistant trees will be killed, due to the loss of the branches, rather than the usual girdling of the main stem.

Apparently, it takes time for inoculum to build up in a plantation; meanwhile the trees are growing older and more resistant (due to the increased length of low branches). Had the highly infected stands been very young, they almost certainly would have already been destroyed. Forest managers are warned that replanting ("filling") highly infected stands, or establishing new plantations close to them, involves a very high risk to the new seedlings.

TABLE 3. Infection and Tree Mortality on Scleroderris Canker Study Plots, 1966-1969, Chequamegon National Forest

Age Group	District	Plantation	Trees Present in 1966	Trees Infected (Percent) 1966	1967	1968	1969	Trees Dead (Percent) 1966	1967	1968	1969
7-10	Washburn	108b	323	32	63	70	85	5	6	7	10
		110a	249	10	12	13	15	7	8	8	8
		110b	186	12	13	12	14	7	8	8	8
		110c	201	15	22	23	35	8	9	9	9
	Total or Average		959	19	32	34	43	6	8	8	9
4-6	Park Falls	69a	257	7	10	10	8	8	13	13	13
	Glidden	85b	141	6	8	9	14	9	11	13	13
		85c	196[a]	11	14	14	18	12	16	16	16
	Washburn	119	253	10	12	12	22	18	26	27	30
	Total or Average		847	9	11	11	16	12	17	18	19
Forest Total or Average			1806	14	22	23	30	9	12	13	14

[a]One plot lost to road construction in 1969.

TABLE 4. Infection and Tree Mortality on Scleroderris Canker Study Plots, 1966-1969, Nicolet National Forest

Age Group	District	Plantation	Trees Present in 1966	Trees Infected (Percent) 1966	1967	1968	1969	Trees Dead (Percent) 1966	1967	1968	1969
7-10	Florence	1a	310	2	5	5	3	2	4	4	4
		2c	385	1	1	1	1	1	2	2	2
	Total or Average		695	1	3	3	2	2	3	3	3
4-6	Three Lakes	46a	312	6	7	8	7	8	22	24	24
	Eagle River	49a	334	21	25	26	44	14	21	23	24
	Laona	6b	192	5	5	5	6	10	15	17	17
	Florence	6i	341	4	6	6	6	8	12	13	13
	Lakewood	9d	301	<1	1	1	1	3	4	4	4
	Total or Average		1480	8	9	10	14	9	15	16	16
Forest Total or Average			2175	6	7	8	10	6	11	12	12

TABLE 5. Infection and Tree Mortality on Scleroderris Canker Study Plots, 1966-1969, Ottawa National Forest

Age Group	District	Plantation	Trees Present in 1966	Trees Infected (Percent) 1966	1967	1968	1969	Trees Dead (Percent) 1966	1967	1968	1969
7-10	Iron River	3017a	146	9	12	13	25	8	12	12	13
		3017b	209	13	17	18	29	10	12	13	13
	Bessemer	2007	196	16	19	19	36	8	11	12	13
	Total or Average		551	13	16	17	30	8	12	12	13
4-6	Bessemer	2015a	221	8	8	10	14	14	15	16	18
		2015c	215	9	10	12	15	13	19	19	20
	Iron River	3025d	198	7	7	7	7	11	15	16	16
	Kenton	4022b-1	330	21	22	23	23	12	19	20	20
		4022b-2	294	5	6	8	13	7	12	13	15
	Total or Average		1258	10	11	13	15	11	16	17	18
Forest Total or Average			1809	11	13	14	20	10	15	16	16

TABLE 6. Infection and Tree Mortality on Scleroderris Canker Study Plots, 1966-1969, Hiawatha National Forest

Age Group	District	Plantation	Trees Present in 1966	Trees Infected (Percent) 1966	1967	1968	1969	Trees Dead (Percent) 1966	1967	1968	1969
7-10	Munising	126d	261	45	54	59	71	25	33	34	38
		129b	306	32	42	40	77	5	6	7	8
	Soo	48a	314	12	16	17	26	9	12	12	12
	Munising	131b	259	12	15	21	29	10	13	14	15
	Total or Average		1140	25	31	34	51	12	16	16	18
4-6	Soo	No No. 2	298	8	11	10	18	25	31	35	37
		No No. 1	229	5	8	12	22	6	8	10	13
		159e	321	4	4	4	8	9	10	11	12
		159i	283	8	13	15	25	8	12	16	18
	Total or Average		1131	6	9	10	18	12	16	18	20
Forest Total or Average			2271	16	20	22	34	12	16	17	19